

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



FARMERS BULLETIN



WASHINGTON, D. C.

720

JUNE 2, 1916

Contribution from the Bureau of Animal Industry, A. D. Melvin, Chief.

PREVENTION OF LOSSES OF LIVE STOCK FROM PLANT POISONING.

By C. DWIGHT MARSH, *Physiologist in Poisonous-Plant Investigations, Pathological Division.*

CONTENTS.

	Page.		Page.
Introduction.....	1	Care in driving stock and in bedding sheep..	7
Eradication of poisonous plants.....	3	Care in handling animals new to a range..	8
Use of range when plants are least poisonous.	5	Elimination of fixed driveways.....	8
Allotment of range to animals not affected		Rotation in use of range.....	9
by poison.....	6	Summary.....	10
Abundance of other feed prevents eating of			
poisonous plants.....	6		

INTRODUCTION

For many years it has been known that the losses of live stock on the ranges of the West were heavy, but recently, through the increased value of the stock and the resulting more careful attention to the sources of loss, the owners have appreciated more fully the important rôle played by poisonous plants in reducing the profits from range animals. Infectious and contagious diseases on the open range do comparatively little harm, while the losses from predatory animals sink into insignificance when compared to the disastrous effects of poisonous plants. The data are not sufficient for an estimate of the total annual loss, but innumerable instances of the heavy toll taken on individual herds where poisonous plants are common might be cited. Loco losses of from 5 to 50 per cent are not at all unusual; deaths of cattle from larkspur up to 10 per cent are quite common; while losses of sheep from death camas

NOTE.—This bulletin supersedes Farmers' Bulletin 536, Stock Poisoning Due to Scarcity of Food.

27922°—No. 720—16

or lupine frequently run from 10 per cent up to 50 or 60 per cent. These losses occur, not occasionally, but continually. While in some years the toll is heavier than in others, yet every year has its story of these deaths. There is, in fact, nothing that interferes to such an extent with the success of handling live stock upon the ranges as the problem of dealing with poisonous plants.

This subject has been under investigation by the United States Department of Agriculture for a number of years and reports have been issued in regard to special plants. The investigation has proved to be a slow and somewhat difficult matter, for it is not simply a question of proving whether a plant has poisonous properties or not, but in addition to this it must be shown whether it does any harm under range conditions; the actual effect of the plant on range animals must be demonstrated, autopsies made, and extended experiments must be conducted on remedies and antidotes. A number of plants have been studied in this way; the conditions under which poisoning may take place have been determined; extended experiments have been made on possible antidotes and methods of preventing losses; and a number of papers have been published giving the results of this work and indicating ways in which the losses may be diminished.

In the course of this experimental work it has become increasingly evident that while detailed investigation is fundamentally necessary, and while much can be accomplished by the application of such remedies as have been found experimentally to be effective, the main reliance, from the practical economic standpoint, must be placed on prevention. The more definite information which has been acquired in regard to the plants themselves has shown that some are poisonous only at certain seasons or under certain conditions. Some never injure certain classes of domestic animals although they may cause heavy losses of others. While definite remedial measures can be used in regard to some forms of poisoning, in regard to others no medical remedy has been found practicable, even after very extended experiments.

Moreover, it has become clear that certain modifications of the ways of managing the range and handling the animals can be formulated, which will make a material reduction of the losses. These modifications are not in all respects new discoveries, for some of them are recognized with more or less clearness by many who are engaged in the problems of range management. This recognition, however, has not been general, the principles have not been definitely stated, and they are not commonly applied in the practical use of the range.

These modifications, which will apply to poisonous plants in general rather than to special cases, have been shown to be desirable as

the result of extended observation and experiment on many ranges in the course of several years' work. Although the subject of so managing the range and so handling the stock as to prevent losses is a complicated one, and when worked in detail must mean definite plans adapted to the local conditions of particular ranges, yet it has become more and more evident that there are certain changes which will apply in principle, if not in detail, to all ranges. These principles, it is thought, should be brought to the attention of stockmen and administrative officers of the range country, even if much work remains in order to make a complete study of the subject; for it is evident that any information which will aid in reducing losses should be published as soon as possible.

ERADICATION OF POISONOUS PLANTS.

The question naturally arises whether it may not be possible to do away with all trouble by destroying those range plants which are productive of harm. A number of ways by which this may be accomplished suggest themselves. Among them are the following:

Crowding out by other plants.—It has been thought, possible, to crowd out some of the poisonous plants by reseeding the range to desirable grasses. While this is theoretically possible, range experience does not give much hope in regard to successful results. As a matter of fact these poisonous plants, as a rule, seem very well adapted to their environment and are likely to hold their own against any introduced plants.

Chemical destruction.—Somewhat extensive experiments were tried in the loco investigation with the hope of finding some cheap substance which would kill loco without injury to other vegetation. These experiments were unsuccessful. It is, of course, not difficult to find substances that will kill all the vegetation, but, apparently, although a great deal of work has been done by many authors on the chemical destruction of weeds, there has been little success in finding a substance that will act in a selective way upon any plants, except the Cruciferae. It therefore seems probable that little can be expected from any attempt to kill out poisonous plants by chemical means.

Close grazing.—In the case of some plants which are injurious to some animals but harmless to others, something may be accomplished by close herding of the animals that are not susceptible of injury. If sheep are close herded on low larkspur, they will accomplish a good deal in the destruction of this plant, for they will clear out the plant very effectively for the time being. Too much must not be expected from this, however, for the larkspurs are perennials and are not easily exterminated.

Destruction of plants by digging out.—This method, so far as our present knowledge goes, is the most effective way of getting rid of the plants and has been proved experimentally to be profitable, within certain limitations. If pastures are under fence it pays well to dig out loco plants. While the ordinary white loco or rattle weed¹ has a root extending down several feet, it can be killed by cutting it off below the crown of buds. If it is cut 2 or 3 inches below the surface the plant is destroyed. This cutting should be done when the plant is in blossom and before it has an opportunity to ripen its seed. A man using a spade can work very rapidly, and the expense of clearing a quarter section or a section is comparatively small. Of course this work has to be repeated to destroy the seedlings, for the loco seed will remain dormant in the soil for several years. The possibility of thus effectively clearing land of loco is not simply a theory but has been proved by actual experiment on land that has been under observation for a period of years. It is not only possible to clear the land, but this method is a success economically.

The tall larkspurs, which cause such heavy losses of cattle, frequently grow in masses in box canyons or about springs where cattle are apt to congregate. Many places of this character have been for a long time known to cattlemen as "poison spots," although the cause of the poisoning has not always been recognized. In many of these places it is entirely feasible to grub out the larkspur, the price of one or two steers paying for a large amount of work. This method, however, is not one of universal application, for on many ranges the larkspurs grow scattered over such a wide area, growing upon rocky hillsides or in the willows in the valleys, that the expense of eradication is more than the range is worth. But with the limitations indicated this method may be used very successfully. It must be remembered, also, that much may be accomplished without the total eradication of the plant if the thick masses which the cattle are most likely to get at are cleaned out, for the animals are not poisoned unless they eat a considerable quantity of the plant.

Water hemlock² frequently grows along ditches on land that is pastured during a part of the year. In such places it is profitable to dig out or pull out the roots, which should then be destroyed.

In the case of some plants digging out would be impracticable. The death camas,³ for instance, grows from a bulb and in such enormous numbers that the cost of digging would be greater than the value of the range. The same thing is probably true of lupine and sneezeweed.⁴

¹ *Oxytropis lamberti*.

² *Cicuta*.

³ *Zygadenus venenosus*.

⁴ *Dugaldia hooopesii*.

In a general way, then, it may be stated that eradication is distinctly profitable in some locations, but it is necessary to study the local conditions of each range and use common sense in planning any attempt to actually destroy the poisonous plants.

USE OF THE RANGE WHEN PLANTS ARE LEAST POISONOUS.

Some plants are much more dangerous at certain times of the year. The common death camas is a spring plant which dries up after blossoming and disappears. Most of the cases of poisoning of sheep by this plant occur in May and June. It is evident that special care should be used in handling sheep in death-camas areas at the time when poisoning may occur. Unfortunately many sheepmen and herders can not identify this plant, and it is of first importance that they should learn to recognize it, especially in its early stages before blossoming, for then it is frequently mistaken for one of the grasses.

The lupines are a source of greatest harm at the time when the pods are full of seeds, for it is the seeds that are especially poisonous. Most of the cases of lupine poisoning occur in the late summer and fall. During especially dry seasons a large part of the lupine seeds may fail to mature, and during such seasons the losses from lupine are apt to be less than after a wet summer. The lupines, then, should be especially avoided in the late summer and fall.

The low larkspurs are spring plants and except at great elevations have largely disappeared by July 1. If cattle can be kept from a range heavily covered with low larkspur until about July 1 there is little danger of loss. This has been clearly recognized in some localities, and the cattle are kept down by an organized body of riders. The tall larkspurs blossom later and do not die down until killed by fall frosts. After blossoming, however, they gradually lose their poisonous properties in all parts of the plant except the seed and cattle seldom eat much of the seed. If the cattle can be kept away until after the tall larkspur has blossomed they can be turned in, and although they then frequently eat the larkspur plants greedily, no harm results. Generally speaking, on the Colorado ranges, the danger period for all larkspurs is over by the middle of July. No definite date can be given, however, for the time when a range is safe, because the time of blossoming may vary because of climatic conditions. On some of the California ranges the larkspur may continue blossoming as late as September, so that there may be cases of poisoning in the fall. Only by actual inspection can one be sure that a range is safe. On some ranges drift fences have been constructed to keep the cattle from the higher ranges which are infested with high larkspur. These drift fences have not in all cases accomplished as much as they should. In some localities the fences keep the cattle down through the whole season, thus permitting much valuable range to remain unused.

Sometimes cattle are admitted through the drift fence at a time when the larkspur is still poisonous, and disastrous results have followed. Generally speaking, the higher ranges are safe in the late summer and fall, but it must be remembered that in a wet or backward season the tall larkspur may be late in blossoming and thus will remain poisonous for a longer period. If by actual inspection it is found that most of the plants have passed the blossoming period, there is very little risk in admitting the cattle to a larkspur-covered range, and thus some of the best forage of the summer may be utilized to good advantage.

ALLOTMENT OF RANGE TO ANIMALS NOT AFFECTED BY POISON.

The loco plants affect all grazing animals, but some plants are poisonous to one class of animals and not to others. Cattle and horses rarely suffer much from death camas, so that they might be grazed where sheep would probably be poisoned. The lupines are much more dangerous for sheep than for cattle and horses. The larkspurs, while deadly for cattle, do not poison horses or sheep. Horses can be affected by larkspur, but as a matter of fact never eat enough under range conditions to harm them. Sheep, on the other hand, not only are not injured by larkspur, but seem to find it a good forage plant. It is evident, then, that a range covered with larkspur can be used for horses or sheep in some cases, and, where it is practicable to make such allotments, it is the simplest way of solving the larkspur problem.

While the investigation work on the sneezeweed of the western ranges is incomplete, enough is now known to show that it is harmful to sheep, but apparently not, under range conditions, to cattle or horses. It might be possible, then, to use safely a sneezeweed range for cattle or horses, while it would be dangerous for sheep.

This method of allotting ranges to animals that can graze upon them with impunity, rather than to attempt to make such changes in the ranges themselves as to adapt them to particular classes of animals, would seem to be the simplest and most natural way of handling the poisonous-plant problem. It is taking the line of least resistance; in other words, using natural resources in the easiest way rather than in a laborious way endeavoring to change natural conditions to suit our own ideas. The method has already been used to a limited extent, but it is susceptible of much wider application.

ABUNDANCE OF OTHER FEED PREVENTS EATING OF POISONOUS PLANTS.

Farmers' Bulletin 536, entitled "Stock Poisoning Due to Scarcity of Food," published in 1913, emphasized the relation between scarcity of food and losses by poisonous plants. This relation can not be

brought too forcibly to the attention of stockmen. Most poisonous plants are unpalatable, and are only eaten under stress of necessity. There are, of course, exceptions to this, for some animals acquire a real passion for certain harmful plants; this is especially true in regard to the loco plants. Generally speaking, however, the poisonous plants are avoided in the presence of good forage; even in the case of the locoes most locoed animals acquire the habit during the seasons when the grass is dry or scarce and the loco is the easiest plant to get. Careful stockmen who see that their animals have an abundance to eat during the seasons when loco is most attractive suffer few losses from this cause. Most of the cases of water-hemlock poisoning occur when there is such a shortage of feed that even roots are eaten.

The heavy losses of sheep from death camas and lupine ordinarily occur when hungry sheep are driven upon an area covered with these plants. This frequently occurs when sheep are turned directly from the cars into a pasture or upon a range where these plants are growing; under such circumstances the sheep fill up on the first plants reached. Some of the heaviest losses of individual owners have happened this way; a striking example of this being a loss of 900 out of a band of 2,000 in Washington in 1915. If the owner in such a case had purchased feed and made sure that the sheep were well filled before being turned out, the animals might have been saved. The losses from some plants like cherry and milkweed almost always occur under stress of a scarcity of good forage. To a less extent it is true of poisoning by the various species of laurels,¹ some of which are found in the mountains of the East as well as in those of the West.

CARE IN DRIVING STOCK AND IN BEDDING SHEEP.

If sheep are bedded for several nights in the same place they will, in going back and forth, eat everything near the bedding ground. Naturally they take the best feed at first, but later they will eat the poisonous plants if they are present. It is not unusual for sheep to be poisoned in this manner after being on a bedding ground for two or three days. So far as poisonous plants are concerned, it is much safer to take a new bedding ground, if possible, every night. The Forest Service is advocating strongly the "open herding" or "blanket herding" or "bedding out" method, both for the sake of the welfare of the sheep and the preservation of the range. This system would avoid much of the loss from poisonous plants, for if the sheep are allowed to graze leisurely and proceed gradually over a range, not retracing their steps but bedding down in the place

¹ Species of *Kalmia*, *Rhododendron*, *Azalea*, *Lencothoe*, *Ledum*, and *Menziesia*.

where they arrive at night, they will select their food with more care and be less likely to eat any injurious plants, as they do not eat these plants by choice. On the other hand, when hungry sheep are being driven they snatch eagerly at any kind of vegetation and do not exercise any selective care in the plants eaten.

The same principle applies to driving cattle through a larkspur region. If cattle are moved from place to place, and it is known that they are to pass through larkspur, care should be taken to have them well fed before making the drive. Hungry cattle will snatch eagerly at whatever can be reached, and tall larkspur is especially tempting under such circumstances. Urged by both hunger and jealousy of each other they will eat all they can reach. It is evident, too, that it is best not to hurry animals on a drive. They should, if possible, be drifted, not driven. When drifted they will spread out and select their food with more care. Many cattle are lost from larkspur and many sheep from death camas and lupine because they are hurried, in compact masses, over a poison area, when they might pass over this area safely if, after feeding, they were drifted across.

CARE IN HANDLING ANIMALS NEW TO A RANGE.

Special care should be exercised when animals are brought in from another region and turned out upon a range to which they are not accustomed. This is well known to most stockmen, but too frequently they do not take the precautions which their own experience tells them are necessary.

ELIMINATION OF FIXED DRIVEWAYS.

In many places cattle and sheep are driven from one range to another over fixed driveways. These driveways in some cases are little more than lanes. Even where there are no fences the driveways are sometimes very narrow. On some ranges used for both cattle and sheep the trails over which the sheep may be moved are definitely marked out and have very narrow limits. These driveways are frequently grazed so completely that no vegetation is left. It is evident enough that sheep coming off a bare driveway will be very hungry and ready to eat everything in their way, sometimes with bad results.

It is not at all unusual for animals to be poisoned on a driveway. In such cases it is frequently stated that while some bunches go over the area with no loss, others are poisoned. This apparently may be explained in this way: The first bunches going over eat the most desirable forage; their successors for lack of other food may eat the injurious plants, until they too are all consumed. After that those following are not poisoned, for there is nothing for them to

eat. This is illustrated on driveways where there is much wild cherry. As a rule the first bunch of sheep will go over such a trail with no harm. Succeeding bunches will graze on the cherry, with resulting illness; but when all the cherry leaves within the reach of the sheep have been eaten, other bunches may go over the same ground with no cases of poisoning.

When a driveway is known to have poisonous plants—and this can as a rule be determined—it should, if possible, be abandoned in favor of one that is safe. It is better to do this, even if the new driveway is somewhat inconvenient. It is still better to do away with definite restricted driveways wherever this is possible. In many places, of course, this can not be done, for the topography is such that the only way of getting from one locality to another is by a narrow driveway, but there are other places on the range where the driveways in use at the present time might be abandoned.

In regions where both cattle and sheep are grazed and it is necessary to restrict each class to a definite location, care should be taken that, so far as possible, successive bunches should not be moved over the same part of a range. Anything approaching a definite driveway should be avoided whenever it can be done.

Generally speaking, both cattle and sheep should be driven as little as possible. Whenever they are moved from one place to another they should be drifted if the conditions will permit. In this way not only will the losses from poisonous plants be lessened, but both the animals and the range will be kept in a better condition.

ROTATION IN USE OF RANGE.

It has already been shown that inasmuch as some of the poisonous plants do not affect certain classes of animals, many losses may be prevented by apportioning the ranges in such a way as to place upon them such animals as will not be harmed by the vegetation on them. This principle has been recognized in the administration of the national forests by the restriction of certain larkspur ranges to the use of horses and sheep. Thus far the general tendency in this apportionment of ranges has been to make certain regions definitely and for an unlimited time sheep ranges or horse ranges. Now it is a well-known fact that the different classes of range animals do not eat the same forage plants. This is especially evident when sheep are compared with cattle and horses. Sheep do not care especially for the grasses, but prefer certain weeds, and if these weeds are present in sufficient abundance the sheep will leave the grasses. A range used exclusively by sheep presents a very different appearance from one used by cattle because of the difference in the plants which remain after grazing. This is no new discovery, but is well known to all who are familiar with range conditions. It follows that

a range depleted by the grazing of one class of animals may be improved by changing to another. In other words, wise "rotation" may greatly benefit the range and at the same time assist in solving the poison-plant problem. Such rotation, however, can be successful only when it is planned out carefully after a thorough knowledge of the local conditions of the range has been obtained, based upon an intimate acquaintance of as long a time as possible. A botanical examination in a single year would not accomplish this, for it could not take into account meteorological and other conditions which might seriously modify the character of the plants on the range.

Such a rotation of grazing herds probably, too, could not be carried out under any fixed plan which would involve definite periods during which the range should be used by any class of animals. The range must be under careful observation and such changes made as are indicated by the condition of the vegetation. Any plan must be more or less experimental and subject to such changes as the needs of the range suggest. No general plan should be adopted, but the individual ranges should be thoroughly studied by local officers and such changes made from time to time as are necessary. A difficulty would doubtless be experienced from the fact that animals become accustomed to a range, and are more easily handled when they are kept on the same range from year to year. The benefits of rotation, however, might counterbalance any trouble from this source.

The rights of the permittees, too, must be recognized and rotation changes should be so made as not to work hardship upon the men using the range. Rotation should not be a universal practice, but should be adapted to the needs of the individual range. If used wisely it would seem possible not only to reduce the losses from poisonous plants, but materially to improve the range.

SUMMARY.

1. Most losses of live stock by poisonous plants are, primarily, more or less closely connected with a lack of suitable forage.

2. While something may be accomplished by the application of medical remedies to the sick animals, the main reliance in reducing losses must be upon careful management of the range and the animals upon it.

3. This management should be directed to the destruction of the poisonous plants in some cases; the use of the range when the plants are not poisonous in other cases; the allotment of some ranges to animals not affected by the plants; care in driving live stock and in bedding places for sheep; the elimination of fixed driveways; and to "rotation" in the use of the range.

**PUBLICATIONS OF U. S. DEPARTMENT OF AGRICULTURE
RELATING TO STOCK-POISONING PLANTS.**

AVAILABLE FOR FREE DISTRIBUTION.

Loco-weed Disease. (Farmers' Bulletin 380.)
Utilization of Logged-off Land for Pasture in Western Oregon and Western Washington. (Farmers' Bulletin 462.)
Larkspur, or "Poison Weed." (Farmers' Bulletin 531.)
Stock-watering Places on Western Grazing Lands. (Farmers' Bulletin 592.)
Eradication of Ferns from Pasture Lands in Eastern United States. (Farmers' Bulletin 687.)
Zygadenus, or Death Camas. (Department Bulletin 125.)

**FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING
OFFICE, WASHINGTON, D. C.**

Cicuta, or Water Hemlock. (Department Bulletin 69.) Price, 10 cents.
Pasture, Meadow, and Forage Crops in Nebraska. (Bureau of Plant Industry Bulletin 59.) Price, 10 cents.
Range Investigations in Arizona. (Bureau of Plant Industry Bulletin 67.) Price, 15 cents.
Larkspurs as Poisonous Plants. (Bureau of Plant Industry Bulletin 111, part 1.) Price, 5 cents.
Mountain Laurel, a Poisonous Plant. (Bureau of Plant Industry Bulletin 121, part 2.) Price, 5 cents.
Protected Stock Range in Arizona. (Bureau of Plant Industry Bulletin 177.) Price, 15 cents.
Relation of Barium to Loco-weed Disease. (Bureau of Plant Industry Bulletin 246.) Price, 10 cents.
Loco-weed Disease of the Plains. (Bureau of Animal Industry Bulletin 112.) Price, 35 cents.
Grazing Problems in the Southwest and How to Meet Them. (Agrostology Bulletin 16.) Price, 5 cents.
Stock-poisoning Plants of Montana, Preliminary Report, 1901. (Botany Bulletin 26.) Price, 25 cents.
Menziesia, Stock-poisoning Plant of Northwestern States. (Bureau of Plant Industry Miscellaneous.) Price, 5 cents.